

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : CITIZEN WATCH CO LTD

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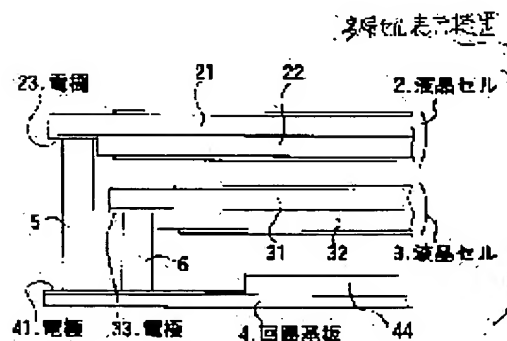
(72)Inventor : SUMIDA TATSUO

(54) MULTILAYER CELL DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To reduce a load on a change of a display specification of a multilayer layer cell display device by being brought respective display cells into contact with all electrodes on a circuit board supplying a driving signal and selectively electrically connecting to only the electrode required in the display cell side.

SOLUTION: A multilayer cell display device 1 is constituted of two sheets of liquid crystal cells 2, 3, a circuit board supplying the displaying drive signal, a joint member 5 electrically connecting the liquid crystal cell 2 to the circuit board and a joint member 6 connecting the liquid crystal cell 3 to the circuit board. The circuit board supplying the drive signal to two sheets of liquid crystal cells 2, 3 mounts an IC 44 having a drive circuit. Then, 16 pieces of electrodes 41 for supplying the drive signal required for both liquid crystal cells 2, 3 outputted from the IC 44 are provided. The joint member 5 connects the electrode 23 to the electrode 41, and the joint member 6 connects the electrode 33 to the electrode 41. Then, the joint



members 5, 6 are constituted so as to be orthogonal to 16 pieces of electrodes 41, and to be respectively in contact with all 16 pieces of electrodes 41.

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Bibliography

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Manufacture Within a station

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5C094

[F term (reference)]

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2H092 GA02 GA05 GA46 NA25 NA27 NA28 PA06

5C094 AA43 AA44 AA48 AA52 BA07 BA43 DA01 DA03 DB01 DB02 DB05 DB08 EA02

EA05 EA06 EB02 EB04 FA01 FA02 FB12 GB01

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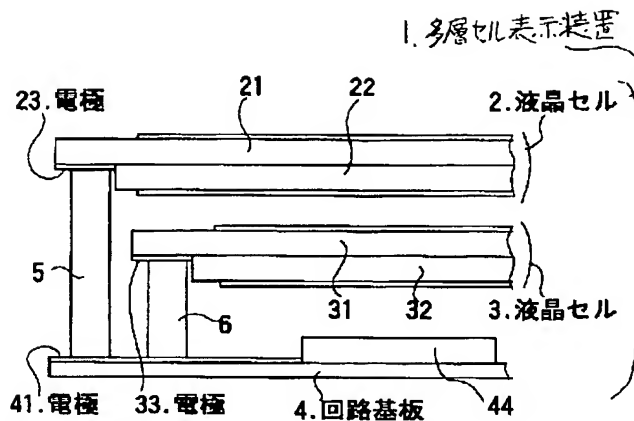
Epitome

(57) [Abstract]

[Technical problem] Since it will be accompanied by modification of the circuit board if the display specification which changes two or more numbers of display patterns of the display cel of each class in the multilayer cel display using the display cel which displays various information in piles in the combination of the superficial pattern of transparency and nontransparent is changed, the burden of modification is large.

[Means for Solution] All the display cels of each class touch all the electrodes on the circuit board, and connect only with the electrode which needs each display cel alternatively in the display cel of each class.

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CLAIMS

[Claim(s)]

[Claim 1] It is the multilayer cel display characterized by to have the display cel which displays various information combining the superficial pattern of transparency and nontransparent with an electric driving signal, to double this display cel in two or more [-fold], and for said each cel of a display to touch all the electrodes on the circuit board which supplies said driving signal in the multilayer cel display which performs the display which said each cel of a display became independent of, and to carry out electrical connection alternatively only to a required electrode by said display cel side.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention doubles the display cel which displays various information combining the superficial pattern of transparency and nontransparent in two or more [-fold], and relates to the structure of an electrode where these two or more of said display cels connect the circuit board which supplies a driving signal, and said each cel of a display in the multilayer cel display which performs the display which became independent, respectively.

[0002]

[Description of the Prior Art] It explains using the example which showed the configuration of the conventional multilayer cel display to drawing 6 . Drawing 6 is the assembly exploded view having shown the two-layer liquid crystal display 71 which uses a liquid crystal cell as a display cel, and displays the liquid crystal cell of two sheets in piles. In addition, in order to simplify explanation, the supporter material which fixes each component omitted.

[0003] The two-layer liquid crystal display 71 consists of connection members 76 which connect electrically the connection member 75 and liquid crystal cell 73 which connect electrically the liquid crystal cells 72 and 73 of two sheets, the circuit board 74 which supplies the driving signal for a display, and a liquid crystal cell 72 and the circuit board 74, and the circuit board 74. The joint material 75 and 76 is a member which has insulation in the other direction, although there is conductivity in drawing Nakagami down, for example, it is zebra rubber which put a thin insulating layer and a thin conductive layer on the multilayer.

[0004] In the example of drawing 6 , seven display patterns are assigned to the upper liquid crystal cell 72, and seven display patterns are also assigned to the lower liquid crystal cell 73. there are eight electrodes required [seven electrodes which a display pattern looks like / one common electrode /, respectively, and are connected since seven display patterns are driven are required, and] since a liquid crystal cell 72 and a liquid crystal cell 73 are driven, respectively.

[0005] The liquid crystal cell 72 has enclosed the liquid crystal matter between the glass 721 and 722 of two sheets, and forms the electrode 723 for receiving the signal which drives a liquid crystal cell 72 in the field of the side which is not visible

among drawing of the level difference which changed and prepared the magnitude of the glass 721 and 722 of two sheets. As for this, the same is said of the case of a liquid crystal cell 73, and, in the case of a liquid crystal cell 73, an electrode 733 is formed in the field of the side which is not visible among drawing of the level difference prepared in one side with an another liquid crystal cell 72. A drawing middle point line shows an electrode 723 and an electrode 733.

[0006] The circuit board 74 which supplies a driving signal to the liquid crystal cells 72 and 73 of two sheets mounts IC744 which has a drive circuit, and forms the electrodes 742 and 743 for supplying said driving signal required for the liquid crystal cell of both which are outputted from IC744. An electrode 742 is formed in the location corresponding to the location of an electrode 723 established in the liquid crystal cell 72, and connects electrodes by the connection member 75. Similarly, an electrode 743 is formed in the location corresponding to the location of an electrode 733 established in the liquid crystal cell 73, and connects electrodes by the connection member 76.

[0007]

[Problem(s) to be Solved by the Invention] However, only an electrode required for the display pattern which each with the liquid crystal cells 72 and 73 of two sheets was assigned as mentioned above is prepared in liquid crystal cells 72 and 73. When an electrode is prepared in the circuit board 74 according to it, the display specification of the two-layer liquid crystal display 71 is changed. When the number of the display patterns assigned to the liquid crystal cells 72 and 73 of two sheets is changed, For example, when the display pattern of the liquid crystal cell 73 of six and the bottom sets the display pattern of the upper liquid crystal cell 72 to eight, In order for the number of the driving signals which each of liquid crystal cells 72 and 73 needs, i.e., the number of electrodes 723 and 733, to change to seven and nine, respectively, It is necessary to also change the electrodes 742 and 743 of the circuit board 74 corresponding to it, and with modification of the display specification of the two-layer liquid crystal display 71, since the circuit board 74 is also changed, the technical problem that a big burden is required occurs.

[0008] When this technical problem is solved and the display specification of said multilayer cel display is changed, even if the purpose of this invention has modification of a display specification by which the number of the display patterns assigned to each display cel kneaded two or more [-fold / especially] is changed, it is to offer the structure of the multilayer cel display which a big burden called modification of the circuit board does not require.

[0009]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the multilayer cel display by this invention In the multilayer cel display which performs the display from which have the display cel which displays various information combining the superficial pattern of transparency and nontransparent with an electric driving signal, doubled this display cel in two or more [-fold], and

said the each cel of a display became independent of Said each cel of a display is a multilayer cel display characterized by being in contact with all the electrodes on the circuit board which supplies said driving signal, and carrying out electrical connection only to the required electrode alternatively by said display cel side.

[0010]

[Embodiment of the Invention] Hereafter, an example of the gestalt of operation by this invention is explained using a drawing. In order for drawing 1 to make it contrast with explanation of the conventional example shown in above-mentioned drawing 6 , the liquid crystal cell was used as the display cel, it was the sectional view showing the two-layer liquid crystal display 1 which displays the liquid crystal cell of two sheets in piles, and in order to simplify explanation, the supporter material which fixes each component omitted. Moreover, drawing 2 is the top view of an electrode section showing the electrode section in an example of the gestalt of operation shown in drawing 1 .

[0011] The two-layer liquid crystal display 1 consists of connection members 6 which connect electrically the connection member 5 and liquid crystal cell 3 which connect electrically the liquid crystal cells 2 and 3 of two sheets, the circuit board 4 which supplies the driving signal for a display, and a liquid crystal cell 2 and the circuit board 4, and the circuit board 4. The joint material 5 and 6 is a member which has insulation in the other direction, although there is conductivity in drawing Nakagami down, for example, it is zebra rubber which put a thin insulating layer and a thin conductive layer on the multilayer.

[0012] It learns from the above-mentioned example, seven display patterns are assigned to the upper liquid crystal cell 2, and seven display patterns are also assigned to the lower liquid crystal cell 3. since 14 display patterns in all are driven, 14 electrodes which a display pattern looks like [two common electrodes], respectively, and are connected are required, and 16 electrodes are required for the circuit board 4 which supplies a driving signal to liquid crystal cells 2 and 3.

[0013] The liquid crystal cell 2 has enclosed the liquid crystal matter between the glass 21 and 22 of two sheets, and forms the electrode 23 for receiving the signal which drives a liquid crystal cell 2 in the field by the side of the circuit board 4 of the level difference which changed and prepared the magnitude of the glass 21 and 22 of two sheets. This of the case of a liquid crystal cell 3 is also the same, and forms an electrode 33 in the field by the side of the circuit board 4 of the level difference which changed and prepared the magnitude of the glass 31 and 32 of two sheets.

[0014] The circuit board 4 which supplies a driving signal to the liquid crystal cells 2 and 3 of two sheets mounts IC44 which has a drive circuit, and forms 16 electrodes 41 for supplying said driving signal required for the liquid crystal cell of both which are outputted from IC44. Although it is necessary to form an electrode 41 in the location corresponding to the location of electrodes 23 and 33, since liquid crystal cells 2 and 3 have formed the electrodes 23 and 33 linked to the circuit board 4 in

the level difference prepared in one side of the same direction among drawing, they can pack an electrode required for both liquid crystal cells 2 and 3 into one place.

[0015] The connection member 5 connects an electrode 23 and an electrode 41, and the connection member 6 connects an electrode 33 and an electrode 41.

[0016] Drawing 2 is a top view showing the electrode 42 of the circuit board 4, the electrode 23 of a liquid crystal cell 2, and the electrode 33 of a liquid crystal cell 3. In fact, 16 electrodes showed every 2 and two centers of both sides to the drive of the display pattern of two liquid crystal cells 2 and 3, in order that need **** might simplify explanation, and other electrodes were omitted to it.

[0017] Since a liquid crystal cell 2 and a liquid crystal cell 3 are driven, 42a to 42p is the electrode prepared in the circuit board 4, puts each in order in parallel and prepares it. The rectangles shown according to the two-dot chain line in drawing are the connection members 5 and 6. 23a to 23p is an electrode prepared in a liquid crystal cell 2, and 33a to 33p is an electrode prepared in a liquid crystal cell 3.

[0018] Since 16 electrodes 41 and the connection members 5 and 6 cross at right angles and each contacts all 16 electrodes, all the 16 electrodes contact each of a liquid crystal cell 2 and a liquid crystal cell 3.

[0019] However, in this example, since it is not necessary to carry out electrical connection of the display cells 2 and 3 to all the electrodes that contact, they do not need to prepare an unnecessary electrode by the display cell 2 and 3 side. That is, in the example shown in drawing 2, since the number of electrodes which needs each display cell 2 and 3 like the above-mentioned is eight, only 23h is formed in glass 21 from electrode 23a so that electrical connection of the liquid crystal cell 2 may be carried out from required electrode 41a to eight [41h]. Since a liquid crystal cell 3 needs eight of electrode 41i to 41p similarly, only electrode 33i to 33p is formed in glass 31. A drawing middle point line shows an unnecessary electrode.

[0020] When the display specification was changed, for example, one electrode required of a liquid crystal cell 2 increases in number, it becomes nine pieces and a required electrode becomes seven pieces by the part liquid crystal cell 3, the decrease of one a liquid crystal cell 2 side It can respond by forming common electrode 23p required for electrode 23i shown in glass 21 by the drawing 2 middle point line, and this electrode 23i, and a liquid crystal cell 3 side making unnecessary electrode 33i shown by the drawing solid line, and not forming electrode 33i in glass 31 so that electrical connection can be carried out with electrode 41i of the circuit board 4.

[0021] Therefore, since it is not necessary to change the electrode 41 on the circuit board 4 even if there is modification of a display specification which changes the number of the display patterns assigned to each of the piled-up display cell, the burden in connection with modification of a display specification can be reduced greatly.

[0022] Drawing 3 and drawing 4 show the gestalt of operation of the 2nd of this invention. Drawing 3 shows the sectional view of the two-layer liquid crystal display

on top of which the liquid crystal cell of two sheets was laid. The two-layer liquid crystal display 31 The circuit board 54 which supplies a driving signal required for the liquid crystal cells 52 and 53 of two sheets, and the liquid crystal cell of both which mount IC544 which has a drive circuit and are outputted from IC544, It consists of connection members 56 which connect electrically the connection member 55 which connects electrically a liquid crystal cell 52 and the circuit board 54, and a liquid crystal cell 52 and a liquid crystal cell 53.

[0023] The electrode 523 which carries out electrical connection to the driving signal of a liquid crystal cell 52 is formed in the field of a level difference which changed the magnitude of the glass 521 and 522 of two sheets, and was established in the circuit board 54 side. On the other hand, the electrode 533 which carries out electrical connection to the driving signal of a liquid crystal cell 53 is formed in the field of a level difference which changed the magnitude of the glass 531 and 532 of two sheets, and was established in the liquid crystal cell 52 side.

[0024] 16 electrodes 541 for supplying a driving signal required for both liquid crystal cells are formed in the circuit board 54 which supplies a driving signal to the liquid crystal cells 52 and 53 of two sheets. An electrode 541 is formed only in the range in which the connection member 55 in contact with the electrode 523 of a liquid crystal cell 52 contacts.

[0025] The connection member 56 is arranged between a liquid crystal cell 52 and a liquid crystal cell 53, and contacts the electrode 523 of a liquid crystal cell 52, and the electrode 533 of a liquid crystal cell 53. A liquid crystal cell 53 is connected to the electrode 541 of the circuit board 54 through the electrode 532 of a liquid crystal cell 52.

[0026] Drawing 4 is the top view having shown the electrode 542 of the circuit board 54, and the electrode 523 of a liquid crystal cell 52. In fact, 16 electrodes showed every 2 and two centers of both sides to the drive of the display pattern of two liquid crystal cells 52 and 53 for explanation, and need **** omitted other electrodes to it.

[0027] Since a liquid crystal cell 52 and a liquid crystal cell 53 are driven, 541a to 541p is the electrode prepared in the circuit board 54, puts each in order in parallel and prepares it. The rectangle shown according to the two-dot chain line in drawing is the connection member 55, and it is the electrode which 523p prepares in a liquid crystal cell 52 from 523a. The connection member 6 shown according to the two-dot chain line in drawing contacts the part which is without extending electrode 523a to 523p, and overlapping in the connection member 55, and contacts the electrode 523 of a liquid crystal cell 52, and the electrode 533 of a liquid crystal cell 53. Electrical connection of the liquid crystal cell 53 is carried out to the circuit board 54 through the electrode 523 of a liquid crystal cell 52. An electrode 533 is not illustrated in drawing 4 .

[0028] Since 16 electrodes 542 and the connection member 55 cross at right angles and each contacts all 16 electrodes, all the 16 electrodes contact each of a liquid

crystal cell 52 and a liquid crystal cell 53.

[0029] With an example of the gestalt of operation shown by drawing 1 and drawing 2, although the electrode with an unnecessary liquid crystal cell 2 did not need to be formed in the liquid crystal cell 2, in order that a liquid crystal cell 53 may contact an electrode 541 through the electrode 523 of a liquid crystal cell 52, all of 16 of electrode 523a to 523p of a liquid crystal cell 52 are need, and it forms 16 of 523p in glass 521 from electrode 523a. On the other hand, since a liquid crystal cell 53 does not need eight [541h] from electrode 541a, only the electrode which carries out electrical connection to glass 532 from electrode 523i through the connection member 56 at 523p is formed.

[0030] the advantage that the burden in connection with modification of a display specification can be greatly reduced since it is not necessary to change the electrode on the circuit board even if there is modification of a display specification which changes the number of the display patterns which the piled-up display cel was alike, respectively, and were assigned by photographing the structure shown in drawing 3 and drawing 4 -- in addition, the area of the electrode 541 on the circuit board 54 can be reduced.

[0031] Drawing 5 is the top view of the circuit board with the explanatory view for explaining an example of the gestalt of operation of this invention in the case of preparing an electrode in the level difference prepared in the piece of the direction where the liquid crystal cell 71 and liquid crystal cell 72 which were shown in the example of drawing 6 explained by the above-mentioned Prior art are different respectively.

[0032] The electrode 642 on the circuit board has prepared all of 16 electrodes required for the drive of all the display patterns of two liquid crystal cells. Moreover, all the 16 electrodes are prepared also in another electrode 642 through the background of the circuit board. An electrode 642 is connected to a driving signal in wiring and the through hole on the background of the circuit board 64 which were shown by the drawing middle point line.

[0033] Even if the electrode of a display cel to pile up is in a separate location, all electrodes required for a display prepare by each part, and since it is not necessary not to change the electrode on the circuit board even if there is modification of a display specification which changes the number of the display patterns assigned to each of the display cel piled up because a display cel contacts all electrodes, the burden in connection with modification of a display specification can decrease greatly. [two or more]

[0034]

[Effect of the Invention] Since it is not necessary to change the polar zone of the circuit board according to this invention as mentioned above even if a display specification is changed, the burden placed on modification of the display specification of a multilayer cel display can be reduced.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view in which showing an example of the gestalt of operation of the multilayer cel display by this invention, and showing structure.

[Drawing 2] It is the top view in which showing an example of the gestalt of operation of the multilayer cel display by this invention, and showing the relation of an electrode.

[Drawing 3] It is the sectional view in which showing another example of the gestalt of operation of the multilayer cel display by this invention, and showing structure.

[Drawing 4] It is the top view in which showing another example of the gestalt of operation of the multilayer cel display by this invention, and showing the relation of an electrode.

[Drawing 5] Still more nearly another example of the gestalt of operation of the multilayer cel display by this invention is shown, and it is the top view of the circuit board.

[Drawing 6] The example of the multilayer cel display by the Prior art is shown, and it is an assembly exploded view.

[Description of Notations]

1 Multilayer Cel Display

2 Liquid Crystal Cell

3 Liquid Crystal Cell

4 Circuit Board

5 Joint Material

6 Joint Material

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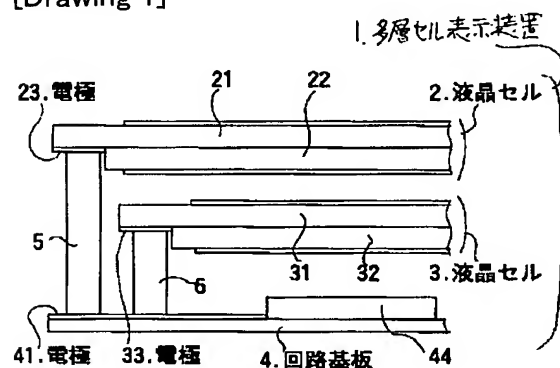
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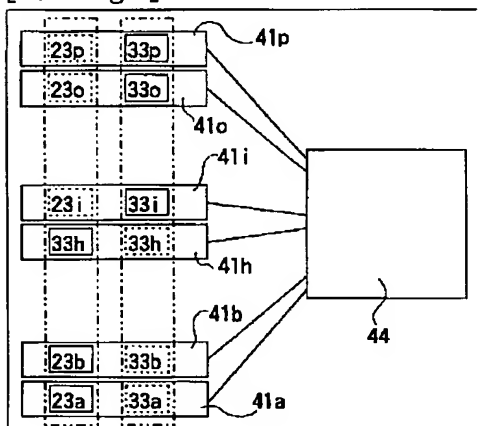
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DRAWINGS

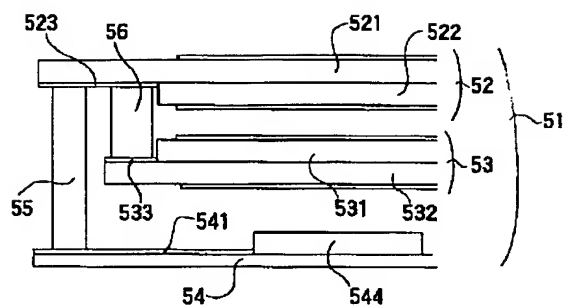
[Drawing 1]



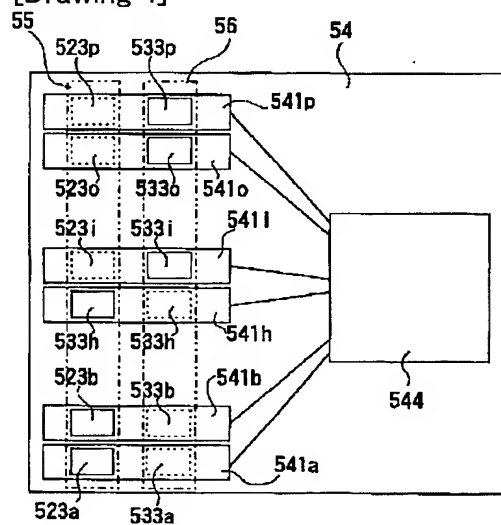
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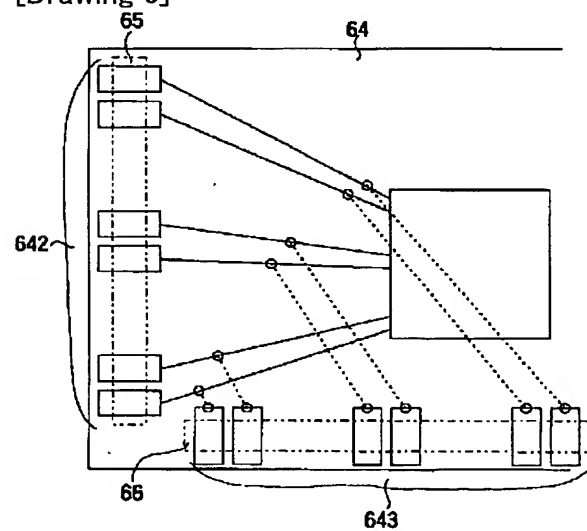
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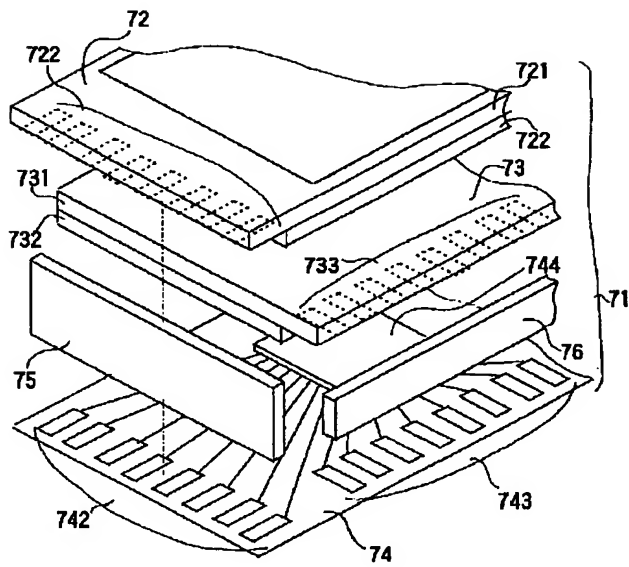
[Drawing 4]



[Drawing 5]



[Drawing 6]



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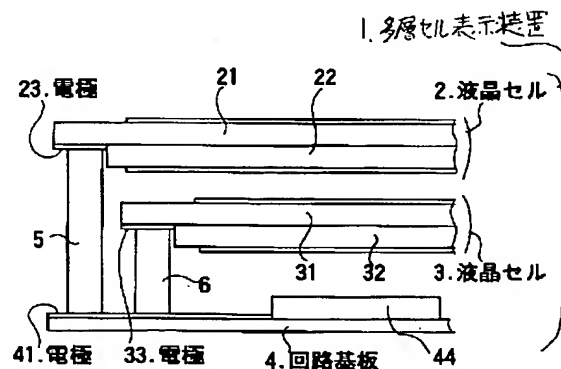
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(54) 【発明の名称】 多層セル表示装置

(57) 【要約】

【課題】 透過と非透過の平面的なパターンの組み合わせで各種情報を表示する表示セルを複数重ねて用いる多層セル表示装置において、各層の表示セルの表示パターン数が変わる表示仕様の変更をすると回路基板の変更を伴うため変更の負担が大きい。

【解決手段】 各層のすべての表示セルが回路基板上のすべての電極と接触しており、各層の表示セルにおいてそれぞれの表示セルが必要な電極にのみ選択的に接続する。



【特許請求の範囲】

【請求項 1】 電気的な駆動信号によって透過と非透過の平面的なパターンを組み合わせる各種情報を表示する表示セルを有し、該表示セルを複数重ね合わせ、前記各々の表示セルが独立した表示を行う多層セル表示装置において、前記各々の表示セルは前記駆動信号を供給する回路基板上のすべての電極と接触しており、前記表示セル側で必要な電極にのみ選択的に電気接続している事を特徴とする多層セル表示装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は透過と非透過の平面的なパターンを組み合わせる各種情報を表示する表示セルを複数重ね合わせ、該複数の前記表示セルがそれぞれ独立した表示を行う多層セル表示装置において、駆動信号を供給する回路基板と前記各々の表示セルとを接続する電極の構造に関する。

【0002】

【従来の技術】従来の多層セル表示装置の構成を図 6 に示した例を用いて説明する。図 6 は液晶セルを表示セルとし、2 枚の液晶セルを重ねて表示する 2 層液晶表示装置 71 を示した組立分解図である。なお、説明を簡単にするために個々の構成要素を固定する支持部材は省略した。

【0003】2 層液晶表示装置 71 は、2 枚の液晶セル 72 および 73 と、表示用の駆動信号を供給する回路基板 74 と、液晶セル 72 と回路基板 74 とを電氣的に接続する接続部材 75 および液晶セル 73 と回路基板 74 とを電氣的に接続する接続部材 76 から構成される。接合部材 75 および 76 は、図中上下方向には導電性があるがそれ以外の方向には絶縁性を持つ部材であり、例えば薄い絶縁層と導電層を多層に重ねたゼブラゴム等である。

【0004】図 6 の例では、上側の液晶セル 72 には 7 つの表示パターンを割り当て、下側の液晶セル 73 にも 7 つの表示パターンを割り当てる。7 つの表示パターンを駆動するために、1 本の共通電極と表示パターンのそれぞれに接続する 7 つの電極とが必要であり、液晶セル 72 および液晶セル 73 を駆動するために必要な電極はそれぞれ 8 個である。

【0005】液晶セル 72 は 2 枚のガラス 721 および 722 の間に液晶物質を封入しており、液晶セル 72 を駆動する信号を受けるための電極 723 は、2 枚のガラス 721 および 722 の大きさを変えて設けた段差の図中見えない側の面に設ける。これは液晶セル 73 の場合も同様であり、液晶セル 73 の場合は液晶セル 72 とは別の一辺に設けた段差の図中見えない側の面に電極 733 を設ける。電極 723 および電極 733 は図中点線で示す。

【0006】2 枚の液晶セル 72 および 73 に駆動信号

を供給する回路基板 74 は、駆動回路を有する IC 744 を実装し、IC 744 より出力する両方の液晶セルに必要な前記駆動信号を供給するための電極 742 および 743 を設ける。電極 742 は液晶セル 72 に設けた電極 723 の位置に対応した位置に設け、接続部材 75 で電極同士を接続する。同様に電極 743 は液晶セル 73 に設けた電極 733 の位置に対応した位置に設け、接続部材 76 で電極同士を接続する。

【0007】

10 【発明が解決しようとする課題】しかしながら前述のように 2 枚の液晶セル 72 および 73 とのそれぞれに割り当てた表示パターンに必要な電極のみを液晶セル 72 と 73 に設け、それに合わせて回路基板 74 に電極を設けた場合、2 層液晶表示装置 71 の表示仕様を変更し、2 枚の液晶セル 72 および 73 に割り当てる表示パターンの数が変更になった時、例えば上側の液晶セル 72 の表示パターンを 6 つ、下側の液晶セル 73 の表示パターンが 8 つとした時、液晶セル 72 および 73 のそれぞれが必要とする駆動信号の数、すなわち電極 723 および 733 の数もそれぞれ 7 つと 9 つに変わるため、それに対応して回路基板 74 の電極 742 および 743 も変更する必要がある、2 層液晶表示装置 71 の表示仕様の変更にとともに、回路基板 74 も変更するので大きな負担を要するという課題がある。

【0008】本発明の目的は、この課題を解決し、前記多層セル表示装置の表示仕様が変更される場合、特に複数重ねられたそれぞれの表示セルに割り当てる表示パターンの数が変更されるような表示仕様の変更があっても、回路基板の変更という大きな負担のかからない多層セル表示装置の構造を提供することにある。

【0009】

30 【課題を解決するための手段】上記目的を達成するために本発明による多層セル表示装置は、電気的な駆動信号によって透過と非透過の平面的なパターンを組み合わせる各種情報を表示する表示セルを有し、該表示セルを複数重ね合わせ、前記各々の表示セルが独立した表示を行う多層セル表示装置において、前記各々の表示セルは前記駆動信号を供給する回路基板上のすべての電極と接触しており、前記表示セル側で必要な電極にのみ選択的に電気接続している事を特徴とする多層セル表示装置である。

【0010】

40 【発明の実施の形態】以下、本発明による実施の形態の一例を図面を用いて説明する。図 1 は前述の図 6 に示した従来例の説明と対比させるために、液晶セルを表示セルとし、2 枚の液晶セルを重ねて表示する 2 層液晶表示装置 1 を示す断面図であり、説明を簡単にするため、個々の構成要素を固定する支持部材は省略した。また、図 2 は図 1 に示した実施の形態の一例での電極部分を示す、電極部分の平面図である。

【0011】2層液晶表示装置1は、2枚の液晶セル2および3と表示用の駆動信号を供給する回路基板4と、液晶セル2と回路基板4とを電気的に接続する接続部材5および液晶セル3と回路基板4とを電気的に接続する接続部材6から構成される。接合部材5および6は図中上下方向には導電性があるがそれ以外の方向には絶縁性を持つ部材であり、例えば薄い絶縁層と導電層を多層に重ねたゼラチン等である。

【0012】前述の例にならって、上側の液晶セル2には7つの表示パターンを割り当て、下側の液晶セル3にも7つの表示パターンを割り当てる。合わせて14個の表示パターンを駆動するために、2本の共通電極と表示パターンのそれぞれに接続する14本の電極とが必要であり、液晶セル2および3に駆動信号を供給する回路基板4には16個の電極が必要である。

【0013】液晶セル2は2枚のガラス21および22の間に液晶物質を封入しており、液晶セル2を駆動する信号を受けるための電極23は、2枚のガラス21および22の大きさを変えて設けた段差の、回路基板4側の面に設ける。これは液晶セル3の場合も同様であり、2枚のガラス31および32の大きさを変えて設けた段差の、回路基板4側の面に電極33を設ける。

【0014】2枚の液晶セル2および3に駆動信号を供給する回路基板4は駆動回路を有するIC44を実装し、IC44より出力する両方の液晶セルに必要な前記駆動信号を供給するための16本の電極41を設ける。電極41は電極23および33の位置に対応した位置に設ける必要があるが、液晶セル2と3は図中同じ方向の一辺に設けた段差に回路基板4と接続する電極23および33を設けているから両方の液晶セル2と3に必要な電極を一箇所にまとめることができる。

【0015】接続部材5は電極23と電極41とを接続し、接続部材6は電極33と電極41とを接続する。

【0016】図2は回路基板4の電極42と液晶セル2の電極23および液晶セル3の電極33を表した平面図である。実際には2つの液晶セル2および3の表示パターンの駆動に16本の電極が必要であるが、説明を簡単にするために両側の2本ずつと中央2本のみを示し、その他の電極を省略した。

【0017】42aから42pは液晶セル2および液晶セル3を駆動するために回路基板4に設けた電極であり、各々を平行に並べて設ける。図中2点鎖線で示した長方形は接続部材5および6である。23aから23pは液晶セル2に設ける電極であり、33aから33pは液晶セル3に設ける電極である。

【0018】接続部材5および6は16本の電極41に直交し、それぞれが16本すべての電極に接触するから、液晶セル2および液晶セル3のそれぞれに16本の電極のすべてが接触する。

【0019】しかし、本実施例において、表示セル2お

よび3は、接触するすべての電極と電気接続する必要はないから、不要な電極は表示セル2および3の側で設ける必要はない。つまり、前述のごとくそれぞれの表示セル2および3が必要な電極数は8本なので、図2に示した例では液晶セル2は必要な電極41aから41hの8本と電気接続するように、ガラス21には電極23aから23hのみが形成されている。同様に液晶セル3は電極41iから41pの8本を必要とするので、ガラス31には電極33iから33pのみが形成されている。不要な電極は図中点線で示す。

【0020】表示仕様が変更になり、例えば液晶セル2で必要な電極が1つ増え9個となり、その分液晶セル3で必要な電極が1つ減って7個になった場合、液晶セル2側は、回路基板4の電極41iと電気接続できるように、ガラス21に図2中点線で示した電極23iと該電極23iのために必要な共通電極23pを形成し、液晶セル3側は図中実線で示した電極33iを不要としてガラス31に電極33iを形成しない事で対応できる。

【0021】従って、複数重ねた表示セルのそれぞれに割り当てられた表示パターンの数が変わるような表示仕様の変更があっても回路基板4上の電極41を変更する必要はないから、表示仕様の変更に関わる負担を大きく低減することができる。

【0022】図3および図4は本発明の第2の実施の形態を示す。図3は2枚の液晶セルを重ね合わせた2層液晶表示装置の断面図を示し、2層液晶表示装置31は、2枚の液晶セル52および53と、駆動回路を有するIC544を実装し、IC544より出力する両方の液晶セルに必要な駆動信号を供給する回路基板54と、液晶セル52と回路基板54とを電気的に接続する接続部材55と、液晶セル52と液晶セル53とを電気的に接続する接続部材56から構成される。

【0023】液晶セル52の駆動信号と電気接続する電極523は、2枚のガラス521および522の大きさを変えて回路基板54の側に設けた段差の面に設ける。一方、液晶セル53の駆動信号と電気接続する電極533は、2枚のガラス531および532の大きさを変えて液晶セル52側に設けた段差の面に設ける。

【0024】2枚の液晶セル52および53に駆動信号を供給する回路基板54には両方の液晶セルに必要な駆動信号を供給するための16本の電極541を設ける。電極541は液晶セル52の電極523に接触する接続部材55が接触する範囲にのみ設ける。

【0025】接続部材56は液晶セル52と液晶セル53との間に配設し、液晶セル52の電極523と液晶セル53の電極533とに接触する。液晶セル53は液晶セル52の電極532を介して回路基板54の電極541に接続する。

【0026】図4は回路基板54の電極542と液晶セル52の電極523を示した平面図である。実際には2

つの液晶セル 5 2 および 5 3 の表示パターンの駆動に 16 本の電極が必要あるが、説明のために両側の 2 本ずつと中央 2 本のみを示し、その他の電極を省略した。

【0027】5 4 1 a から 5 4 1 p は液晶セル 5 2 および液晶セル 5 3 を駆動するために回路基板 5 4 に設けた電極であり、各々を平行に並べて設ける。図中 2 点鎖線で示した長方形が接続部材 5 5 であり、5 2 3 a から 5 2 3 p が液晶セル 5 2 に設ける電極である。図中 2 点鎖線で示した接続部材 6 は、電極 5 2 3 a から 5 2 3 p が延長されて接続部材 5 5 とは重なり合わずにいる部分に接触し、液晶セル 5 2 の電極 5 2 3 と液晶セル 5 3 の電極 5 3 3 と接触する。液晶セル 5 3 は液晶セル 5 2 の電極 5 2 3 を介して回路基板 5 4 と電気接続する。電極 5 3 3 は図 4 中には図示しない。

【0028】接続部材 5 5 は 16 本の電極 5 4 2 に直交し、それぞれが 16 本すべての電極に接触するから、液晶セル 5 2 および液晶セル 5 3 のそれぞれに 16 本の電極のすべてが接触する。

【0029】図 1 および図 2 で示した実施の形態の一例では、液晶セル 2 が不要な電極は液晶セル 2 に形成する必要がなかったが、液晶セル 5 3 が液晶セル 5 2 の電極 5 2 3 を介して電極 5 4 1 と接触するため、液晶セル 5 2 の電極 5 2 3 a から 5 2 3 p の 16 本がすべて必要であり、ガラス 5 2 1 に電極 5 2 3 a から 5 2 3 p の 16 本を形成する。一方、液晶セル 5 3 は電極 5 4 1 a から 5 4 1 h の 8 本を必要としないので、ガラス 5 3 2 に接続部材 5 6 を介して電極 5 2 3 i から 5 2 3 p に電気接続する電極のみを形成する。

【0030】図 3 および図 4 に示した構造を撮ること、で、複数重ねた表示セルのそれぞれに割り当てられた表示パターンの数が変わるような表示仕様の変更があっても回路基板上の電極を変更する必要はないから、表示仕様の変更に関わる負担を大きく低減することができるという利点に加えて、回路基板 5 4 上の電極 5 4 1 の面積を減らすことができる。

【0031】図 5 は、前述の従来の技術で説明した図 6 の例に示した、液晶セル 7 1 と液晶セル 7 2 とがそれぞれ別の方向の一片に設けた段差に電極を設ける場合の本発明の実施の形態の一例を説明するための説明図で回路

基板の平面図である。

【0032】回路基板上の電極 6 4 2 は 2 つの液晶セルのすべての表示パターンの駆動に必要な 16 本の電極をすべて設けている。また、もう一方の電極 6 4 2 にも回路基板の裏側を介して 16 本の電極のすべてを設けている。電極 6 4 2 は図中点線で示した回路基板 6 4 の裏側の配線とスルーホールで駆動信号に接続する。

【0033】重ね合わせる表示セルの電極が別々の場所にあっても、それぞれの部位で表示に必要なすべての電極を設け、表示セルがすべての電極と接触する事で複数重ねた表示セルのそれぞれに割り当てられた表示パターンの数が変わるような表示仕様の変更があっても回路基板上の電極を変更する必要はないから、表示仕様の変更に関わる負担を大きく低減することができる。

【0034】

【発明の効果】以上のように本発明によれば、表示仕様の変更になっても回路基板の電極部を変更する必要がないから、多層セル表示装置の表示仕様の変更にかかる負担を減らすことができる。

【図面の簡単な説明】

【図 1】本発明による多層セル表示装置の実施の形態の一例を示す、構造を示す断面図である。

【図 2】本発明による多層セル表示装置の実施の形態の一例を示し、電極の関係を示す平面図である。

【図 3】本発明による多層セル表示装置の実施の形態の別の一例を示し、構造を示す断面図である。

【図 4】本発明による多層セル表示装置の実施の形態の別の一例を示し、電極の関係を示す平面図である。

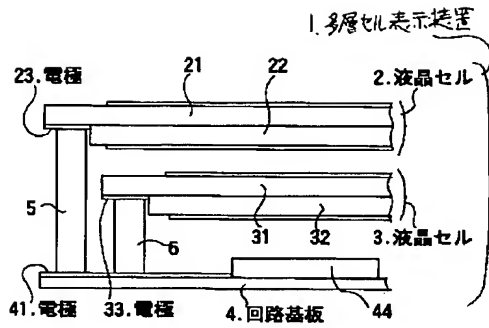
【図 5】本発明による多層セル表示装置の実施の形態のさらに別の一例を示し、回路基板の平面図である。

【図 6】従来の技術による多層セル表示装置の例を示し、組立分解図である。

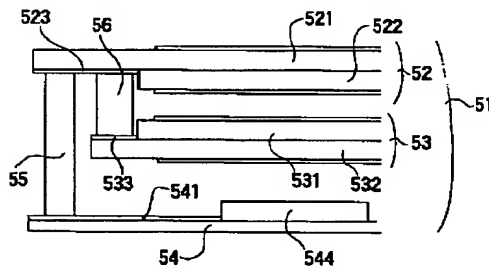
【符号の説明】

- 1 多層セル表示装置
- 2 液晶セル
- 3 液晶セル
- 4 回路基板
- 5 接合部材
- 6 接合部材

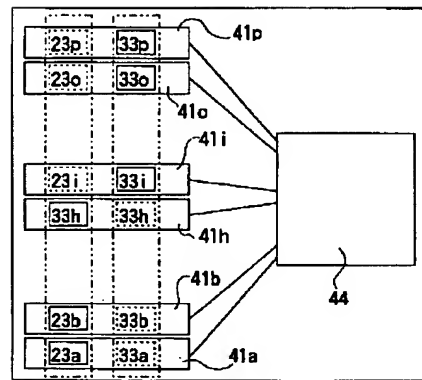
【図1】



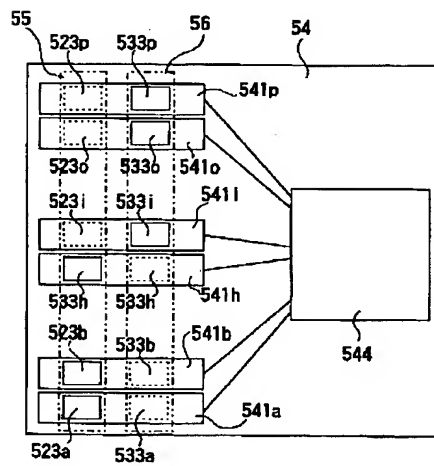
【図3】



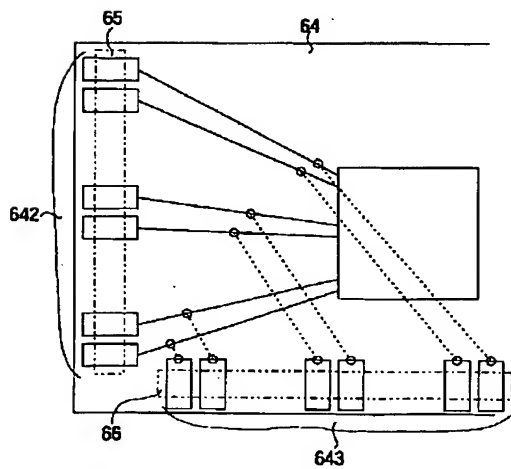
【図2】



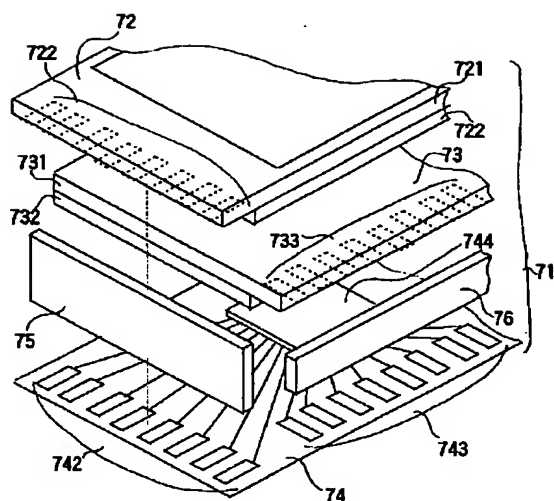
【図4】



【図5】



【図6】



フロントページの続き

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